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Alejandro Casallas Lagos, Post-doc

A Coherent Unmodel Search for Strong Lensed Compact Binaries with cWB

Abstract

Gravitational lensing by massive astrophysical structures is a key prediction of General Relativity. In the gravitational-wave (GW) regime, an intervening galaxy or cluster can split a GW signal into multiple signals arriving along different paths with modified amplitudes, phases, and time delays. As detector networks are expected to approach $O(10^3)$ binary black hole merger detections in upcoming observing runs like O5, detecting strongly lensed GWs is becoming both feasible and timely. In this talk, I will present preliminary results from a novel method designed to search for strongly lensed GW signals from binary black hole mergers using the Coherent Waveburst algorithm (cWB). This approach offers two major strengths: robust multi-detector signal validation through coherence, and unmodeled searches that remain agnostic to waveform systematics. Overall, this methodology establishes a new framework for identifying strong lensing signatures as detector sensitivities continue to improve.